Index

Isotopes and Radiation Technology

Volume 3

Note: The page range for each of the four issues of Vol. 3 is as follows: No. 1, pages 1 to 84; No. 2, pages 85 to 178; No. 3, pages 179 to 295; and No. 4, pages 297 to 394.

A

Accelerators
(see also Cyclotrons, Electron accelerators, Neutron generators, Van de Graaff accelerators, and X-ray generators)
industrial applications, 297-310
industrial applications, comparison with radioisotopes, 308-10
industrial, U. S. manufacturers listing, 298
industrial, world distribution, 298
Acrylate monomers
radiation polymerization in wood, 123 126-27
Acrylonitrile
radiation copolymerization with styrene, 124-26
Actinium–beryllium sources
use in petroleum industry, 105
Actinium–boron sources
use in petroleum industry, 105
Activation analysis
applications in oil field tracing, 109
applications in oil-well logging, 226-27
applications in ore prospecting, 226-27
application to quality control, 284
gamma, use on rocks and ores, 334-37
methods development, 73-74
neutron generator applications, 301-03
research activities of Western New York Nuclear Research Center, 13-14
technique using ^{3}He-ions, 284
Agriculture
radiation studies in Romania, 386
tracer uses in Romania, 388
Aircraft
liquid-fuel gage development, 284
Akademie-Verlag
Isotopenpraxis published, 294-95
Alkali halides
radiation sensitization of bacteria, 233
Aluminum
corrosion studies using kryptonates, 326
temperature measurements using kryptonates, 321
American Nuclear Society
conference sponsor, radioisotope production and application, 75-76
Americium-241
use in medical radiography, 101
use in neutron sources, 61-62
use in steel tube radiography device, 96-98
Americium–beryllium sources
use in petroleum industry, 105
Animals
radioisotopes use in veterinary medicine, 382-83
Anthraquinone dyes
effects on radiation polymerizations in wood, 127
Antibiotics
food preservation using, effects in combination with irradiation, 43-44
Antimony-124
sale and production withdrawal, 174
Aqueous solutions
analysis using kryptonates, 211
Archeology
radiocarbon dating applications, 24-25, 28-29
Arsenic-76
sale and production withdrawal, 174
Arsenic-77
sale and production withdrawal, 174
Atmosphere
^{14}C and ^{3}H measurements in, 25-26
Atomic Energy Commission
history of food-irradiation program, 349-50
isotopes and radiation development research, 164-66
isotopes and radiation use study, 78-79
radioisotopes production and distribution services, 292
review of food-irradiation developments, 350-51
Australia
radioisotopes production and use, 270-73
Azo dyes
effects on radiation polymerization in wood, 127

B

Bacteria
(see also Clostridium botulinum and Salmonella)
radiation resistance in marine products, 372
radiation sensitization by chemicals, 232-34
Barium isotopes
stable, purification of enriched, 196-98
Berkelium
production in HFIR, 80-81
Beta sources
hazards evaluation of fire damaged, 71-72
Big Rock Point Nuclear Power Plant
production of ^{60}Co, 393
Blood
parasitic loss in animals, ^{59}Fe use, 383
Bone grafts
sterilization by electron irradiation, 306-07
Bones
mineral content determination using low energy sources, 100-01
Boris Kidric Institute of Nuclear Sciences
radioisotopes production, 267-68
Borosilicate glass
properties as ^{137}Cs power source material, 148-49
Brain
scanning in animals, ^{203}Hg use, 383
Bremsstrahlung
yield equations for ^{90}Sr-^{90}Y and ^{147}Pm sources, 91
Bromine-82
sale and production withdrawal, 174

C

Cadmium-109
sale and production withdrawal, 174
Cadmium-115
sale and production withdrawal, 174
Cadmium-115m
sale and production withdrawal, 174
Californium
production in HFIR, 80-81
Calutrons
(see also Electromagnetic separation)
removal methods for pocket deposits, 196
Carbon-14
hydrological applications, 26, 28-29
measurements in the atmosphere and oceans, 25-26
processing and counting of natural, 23
use in archeologic dating, 24-25, 28-29
use in tree ring dating, 27-28
Carbon tetrachloride
effect on copolymerization of styrene and acrylonitrile, 124-27
Cardiac pacemakers
nuclear-powered, development, 293-94
Castings
radiographic inspection developments,

298-301
Catalysts
use in production of wood-plastic combinations, 118
Cellulose
radiation effects, 120, 237-38
radiation-induced grafting to, 238
Cerium-144
price changes, 79, 189
properties as power source material, 147-48
Cerium oxides
properties as isotopic power source material, 147-48
Cesium-137
price changes, 79, 189
properties as power source material, 148-49
shipment to France, 80
use in food irradiators, 348-49, 359-60
use in USSR teletherapy units, 81
Cesium chlorides
phase change detection using kryptonates, 327
Chemical agents
food preservation using, effects in combination with irradiation, 42-46
Chemical analysis
tracer uses in Romania, 386-87
Chemical industry
activation analysis applications, 302
effect of radiation preservation of food on, 40
tracer uses in Romania, 387
Chemicals
manufacture, radiation processing, 385
Chemistry
(see also Radiation chemistry)
recovery of enriched stable isotopes, 193-200, 312-15
Chicken
irradiation program at Holly Farms, Inc., 363
Chlorine isotopes
photochemical separation, literature review, 203
Chlorotetracycline
food preservation using, effects in combination with irradiation, 43
Chromium-51
use in Gemini V astronauts, 81
Chromium isotopes
stable, purification of enriched, 312-13
Clathrates
(see Kryptonates)
Clostridium botulinum
(see also Bacteria)
inactivation of type E toxin by cooking, 377-78
radiation resistance in marine products, 372
role in quality of fresh and irradiated fish, 371-72
suppression by irradiation, 352, 354
Coatings
corrosion protection properties, 326
photodegradation studies, 326-27
thickness gaging with low energy gamma sources, 96-97
Cobalt-58
medical uses, regulations, 76
Cobalt-60
medical uses, regulations, 76
price changes, 173-74, 189, 293
production, 76, 189, 289
production in commercial power reactor, 393
properties as power source material, 149-50
sterilization facilities for medical supplies, 166
use in food irradiators, 340-48, 359-60
Cod
spoilage processes in fresh and irradiated, 375
Cold-cathode discharge tubes
ignition delay times control in, radioisotopes properties for, 162
Computer programs
ISOCRUNCH, description, 19
ISOPOWER, description, 19-20
ISOSEARCH, description, 20
ISOTOPES, description, 19
Computers
programming for nuclear geophysics studies, 218-19
Conferences
^{14}C and ^{3}H dating, 22-29
commercial aspects of wood-plastic combinations, 280-81
food preservation, military-industry, 167-69
labeled compounds, 267, 391-92
low energy x- and gamma-ray sources, proceedings, 76
low energy x- and gamma-ray sources, summary, 88-102
Mossbauer effect, research and industrial applications, 170-72
radioisotope applications in aerospace, 281-83
radioisotope instruments in industry and geophysics, 217-27
radioisotope production and uses, 75-76, 392
radioisotopes use in industry, 270
radiopharmaceuticals uses, 169-70
trace characterization in materials research, 295
Construction materials
potential applications of wood-plastic combinations, 140
Containers
use in radiation processing of foods, 37-38
Copper
wear measurement using kryptonates, 324-25
Copper-64
sale and production withdrawal, 174
Corrosion
studies using kryptonates, 322-24, 326
Cotton
radiation graft polymerization effects, 58
Counting techniques
developments for natural ^{14}C and ^{3}H, 23-24
Cows (radioisotope)
production, properties and use of medical, 1-12
Crystals
phase change detection, 327
Curium-242
production, 289
properties as power source material, 150
Curium-244
production, 289
properties as power source material, 150-51
use in neutron sources, 61-62
Curium oxides
properties as isotopic power source material, 150-51
Current literature
listings, 393-95
Cyclotrons
production of carrier-free radioisotopes, 85-87
radioisotopes production in Yugoslavia, 268-69

D

Dating
use of ^{14}C and ^{3}H in, conference, 22-29
Density gages
description of ocean sediment, 216, 285
use in well logging, gamma-gamma devices, 107
Department of Commerce
activities in food-irradiation program, 358-59
Deuterium
photochemical separation, literature review, 203
Discharge tubes
(see Cold-cathode discharge tubes)
Division of Isotopes Development
director appointed, 172-73
operating funds, FY-1965-1967, 283
program outline, 283-91
radiation polymerization programs, 50
technical programs director appointed, 392
Drugs
(see Pharmaceuticals)
Dyes
(see Anthraquinone dyes and Azo dyes)

E

East Germany
stable isotopes availability, tables, 273-75
Economics
industrial applications of radioisotopes, IAEA survey, 152-66
potential impact of radiation preservation of food, 34-42
wood-plastic combinations production, 136-39
Einsteinium
production in HFIR, 80-81
Electromagnetic separation
chemistry of stable isotope recovery, 193-200, 312-15
direct target preparation in East Germany, 275
Electron accelerators
activation analysis applications, 334-37
applications in radiation processing, 303-08, 360-61
Enzymes
activity, isotopic method sensitivity increase, 333-34
activity, procedures for isotopic method, 329-33
activity, sensitivity and cost of isotopic method, 329
Eurisotop Bureau
activities description, 263-66
information and documentation activities, 263-64
publications listing, 265-66
European Atomic Energy Community (Euratom)
Bureau Eurisotop activities, 263-66
labeled compounds program, 266-67
Europium-152
price changes, 293

F

Fat
measurement in tissue, 101
Fatty acids
manufacture, radiation processing, 385
Fermium
production in HFIR, 80-81
Film
(see Photographic film)
Fish
(see also Seafoods)
effect of cooking on botulinum toxin, 377-78
effect of preirradiation age on shelf life, 367-68
handling and distribution practices, 374-77
irradiation program at Gorton Corp., 363-64
microbiological quality of fresh and irradiated, 370-72
On-Board-Ship Irradiator description, 32, 346-48
radiation pasteurization, quality and wholesomeness studies, 365-78
spoilage processes in fresh and irradiated, 372-75
Fission products
price change, 189
Flow gages
high-head-turbine rating system, 217
Fluorine
detection system using ^{85}Kr, 212-14
Food
(see also Seafood and specific foods)
irradiated items approved by FDA, 355
irradiation developments, foreign research, 41-42
irradiation developments, review, 164, 189-90, 290-91, 350-51
irradiation petitions to FDA, 33
irradiation program history, 349-50
irradiator development, 30-33, 340-49
preservation, combination of additives and irradiation, 42-46
radiation preservation, economic aspects, 34-42
radiation preservation, military-industry conference, 167-69
radiation processing, 1965 JCAE hearings, 290-91, 349-65
radiation processing, use of chemical sensitizers, 232-34
radiation processing, use of electron accelerators, 307, 360-61
sterilization standards, 352
toxicological safety of irradiated, 352-53
wholesomeness of irradiated, 351
Food and Drug Administration (FDA)
food-irradiation petitions, 33
irradiated foods approved as of April 1965, 355
responsibility in food-irradiation program, 358
Forestry
radiation studies in Romania, 386
tracer uses in Romania, 388
Fowler, E. E.
appointed Director, Division of Isotopes Development, 172-73
France
radioactive material shipment to, 80
Free radicals
formation in wood-plastic materials, 117-18
Friction
studies using kryptonates, 318-25
Fruit
(see also Food)
irradiator description, 343-46, 348
radiation disinfestation, 357
review of radiation preservation program, 356-57
U. S. production in 1963, 35
Fuel elements
(see Reactor fuel elements)
Furniture
potential applications of wood-plastic combinations, 140

G

G value
polymerization of monomers, 54
radiation changes in hydrocarbons, 53
Gages
(see also Density gages, Flow gages, Moisture gages and Thickness gages)
beta, hazards evaluation of fire damaged, 71-72
economics of industrial radioisotope, 158
industrial applications, conference summary, 222-25
industrial applications, growth trends, 187
labeling and installation requirements, 77
liquid-fuel, development for aircraft, 284
number and applications in industry, 156-57
radiometric, use in Greece, 74
radiometric, use in Romania, 385-86
sources used in, 155
Gamma logging
applications in ore prospecting, 225-26
Gamma radiation
activation analysis applications, 334-37
defect production in semiconductors, 61
effects on cellulose and wood, 120
Gamma sources
isotopes suitable for radiography, 159
low energy applications, conference proceedings, 76
low energy applications, conference summary, 88-102
low energy, summary of currently used, 90
number in industrial radiography use, 159
use to study radiation damage in semiconductors, 58-63
Gamma spectra
activation analysis of Ti–Zr ores, 337
standard library available, 174
Gas chromatography
detector performance, 161
Gases
(see also Natural gas)
effects on irradiated seafood, 367
radioactive, tracer uses in natural-gas reservoirs, 109
Gemini V
tracer uses in astronauts, 81
Geology
applications of ^{14}C and ^{3}H in, 25-27, 28-29
Geophysics
radioisotope instrumentation, AEC program, 214-17
radioisotope instrumentation, conference summary, 217-27
Germanium
conduction-electron removal by neutrons, 61-62
Germany
(see East Germany and West Germany)
Glands
(see Thyroid gland)
Glass
(see Borosilicate glass)
Gnome project
production of transplutonium elements, 315-16
Gold
detection unit development, 216, 285
Gold-198
sale and production withdrawal, 174
use in turbine rating system, 217
Gold-199
sale and production withdrawal, 174
Gorton Corporation
food-irradiation program, 363
Grain Products Irradiator
description, 343, 345
Gravimetric analysis
tracer uses in Romania, 386-87
Greece
status of radioisotope development, 73-74

H

Haddock
effect of cooking on botulinum toxin, 377-78
Hafnium-181
price changes, 293
Hafnium isotopes
stable, purification of enriched, 198-200
Half-life
concept for medical radioisotopes, 2
revisions for specific isotopes, 294
Halogenophenols
radiation sensitization of bacteria, 233
Hawaii Development Irradiator
description, 348
Hawaiian Research Irradiator
description, 342-43
Heat sources
development, for electric-power generation, 165, 190-91, 286-88, 292
production and properties, 147-51, 289
Helicopters
formation-keeping system development, 284
Helium-3 ions
application in activation analysis, 284
High Flux Isotope Reactor (HFIR)
operation, transplutonium element production, 80-81
High Intensity Radiation Development Laboratory (HIRDL)
availability to industry, 189
Holly Farms Poultry Industries, Inc.
food-irradiation program, 363
Hot cells
description of Western New York Nuclear Research Center, 17
Human beings
(see Man)
Hydrocarbons
radiation changes, G values for, 53
Hydrogen
detection system using ^{85}Kr, 212-14
Hydrogen isotopes
(see Deuterium and Tritium)
Hydrology
applications of ^{14}C and ^{3}H in, 26, 28-29
tracer studies, 73, 272, 388
Hydrospace
radioisotope applications, 285-86

I

Ice
  detection device licensing, 77
Image amplifier systems
  organ visualization using low energy sources, 101-02
Indium-114
  price changes, 293
Industry
    (see also Chemical industry, Marketing industry, Mining industry, Petroleum industry, and Transportation industry)
  economics of radioisotopes applications, IAEA survey, 152-66
  impact of USAEC isotopes development program, 164-66
  isotopes and radiation use, AEC study, 78-79
  participation in food irradiation program, 292, 361-65
  particle accelerator uses, 297-310, 360-61
  radiographic source development, 96-98
  radioisotope instrumentation, AEC program, 214-17
  radioisotope instrumentation, conference summary, 217-27
  radioisotopes use, Bureau Eurisotop activities, 263-66
  radioisotopes use, conference, 270
  tracer uses in, Australian studies, 272
  trends in isotopes and radiation applications, 185-91
Information services
  Isotopes Information Center description, 179-84
Insects
  radiation eradication from fruit, 357
Instrumentation
  radioisotope, AEC program, 214-17
  radioisotope, conference summary, 217-27
  radioisotope, development of analytical, 219-22
International Atomic Energy Agency (IAEA)
  survey, economics of industrial applications of radioisotopes, 152-66
Iodine
  metabolism, linear compartment model, 251-52
Iodine-125
  medical uses, regulations, 76
  use in Gemini V astronauts, 81
  use in medical radiography, 99-102
Iodine-131
  medical uses, regulations, 76
  use in veterinary medicine, 382-83
Iodoacetamide
  radiation sensitization of bacteria, 234
Iridium-194
  price changes, 293
Iron
  metabolism, linear compartment model, 252-53
Iron-55
  price changes, 293
Iron-57
  availability at ORNL, 174
Iron-59
  price changes, 293
  use in veterinary medicine, 383
Irradiation facilities
    (see also Grain Products Irradiator, Hawaii Development Irradiator, Marine Products Development Irradiator (MPDI), Mobile Gamma Irradiator and On-Board-Ship Irradiator)
  choice for wood-plastic combinations, 132-33
  costs for wood-plastic combinations, 138
  description of Canadian, 294
  description of food-processing, 30-33, 291, 340-49
  description of Yugoslavian, 270
  description of Western New York Nuclear Research Center, 14-18
  electron, contract service availability, 307-08
  massive, economics of industrial, 163
  portable, description of food-processing, 348-49
  potential market for radiation processing of food, 38
  research, description of food-processing, 342
Isotope production
  computer codes development at ORNL, 18-20
  facilities at Western New York Nuclear Research Center, 13-14
  program summary, 1965-1966, 288-89
Isotope separation
    (see also Electromagnetic separation)
  photochemical methods, literature review, 200-03
    program summary, 1965-1966, 288-89
Isotopes Development Program
  operating funds, FY-1965-1967, 283
  summary, 283-91
Isotopes Information Center
  opening announced, 174-75
  organization and operation, 179-84
Isotopic power sources
    (see Heat sources)
Isotopic power systems
  development progress, 190-91
  space program administration, 173

J

Joint Committee on Atomic Energy (JCAE)
  1965 food-irradiation hearings, 349-65
  hearings summary on isotopes program, 291-92
Journals
  Isotopenpraxis published, 294-95

K

Krypton-85
    (see also Kryptonates)
  applications in chemical analysis, 210-14
  enrichment facility, 289
  incorporation into solids, 207-10
  tracer uses in natural-gas reservoirs, 109
Kryptonates
    (see also Krypton-85)
  preparation and properties, 207-10
  use in chemical analyses, 210-14
  use in materials research, 318-28
  use in oxidation studies, 322-26
  use in phase change detection, 327
  use in stress-strain studies, 327-28
  use in surface temperature measurement, 319-22
  use in wear studies, 324-25

L

Labeled compounds
    (see also Tracers)
  assaying methods, 392
  biochemical synthesis methods, 392
  chemical synthesis methods, 391
  conferences, 267, 391-92
  Euratom registry, 266
  journal publication, 267
  preparation and storage, conference, 391-92
  production and uses in Romania, 385
  production and use in Yugoslavia, 267-70
  radiochemical synthesis methods, 391-92
  synthesis and uses, Euratom activities, 266-67
Lanthanum-140
  sale and production withdrawal, 174
Lead isotopes
  stable, purification of enriched, 196-98
Licensing
  ice-detection device, 77
  industrial use of radioisotopes, 186
  tritium exemption, 392-93
Linear first-order compartment analysis
  description and applications, 249-54
Lipton (Thomas J.), Inc.
  food-irradiation program, 363
Literature reviews
  general, 175-78
  photochemical separation of isotopes, 200-03
  production and applications of isotopes, 82-84
  radiation sensitizers in food, drugs, and medical supplies, 232-34
  wood-plastic combinations, foreign developments, 129-31
Lithium isotopes
  photochemical separation, literature review, 201-02
Liver
  function test in animals, ^{131}I use, 382-83

M

Malemide, N-ethyl
  radiation sensitization of bacteria, 234
Man
  exposure data for ^{125}I intraoral x-ray unit, 100
Marine Products Development Irradiator (MPDI)
  availability for industry studies, 78
  description, 342-44
Marketing industry
  effect of radiation preservation of food on, 40
Meat
  irradiation program at Swift and Company, 362-63
  review of radiation sterilization program, 353-56
  U. S. production in 1963, 35
Medical supplies
  radiation processing, use of chemical sensitizers, 232-34
  sterilization by electron irradiation, 306
  sterilization facilities, 166
Medicine
    (see also Veterinary medicine)
  radiographic source development, 96-98
  radioisotopes use in, production from cows, 1-2
  radioisotopes uses, regulations, 76
  radiopharmaceuticals uses, conference, 169-70
  tracer theory and applications, 245-57
  tracer uses in Australia, 272
  tracer uses in Romania, 388-89
Mercury-196
  availability at ORNL, 174

Mercury-197
sale and production withdrawal, 174
Mercury-203
sale and production withdrawal, 174
use in veterinary medicine, 383
Mercury isotopes
photochemical separation, literature review, 201-02
Meteorology
tracer uses in, Australian studies, 272
Methane
detector using tritium, 217
Methanol
analysis for water impurity using ^{85}Kr, 211
Methyl methacrylate
evaluation for wood-plastic combinations, 133
impregnation in wood, concentration gradient, 134
radiation polymerization in wood, 123, 126-27
Microwave spectrometers
use in stable isotope measurement, 284-85
Milking systems
medical radioisotope production from, 1-12
Mining industry
tracer uses in Romania, 387-88
Missiles
inspection of solid-propellant motors, 300
Mobile Gamma Irradiator (MGI)
description, 343-46
Moisture gages
description of ocean sediment, 216, 285
industrial applications, conference summary, 222-25
Molybdenum-99
sale and production withdrawal, 174
Monomers
(see also specific monomers)
costs for wood-plastic combinations, 139
evaluation for wood-plastic combinations, 133
radiation grafting to wood, 121
radiation polymerization, G values, 54
radiation polymerization in the solid state, 52
vacuum impregnation in wood, 132
wood-impregnation methods, 128-29
Mossbauer effect
industrial applications, conference, 170-72
Motion pictures
availability, 293
Mott, W. E.
appointed DID technical programs director, 392

N

National Bureau of Standards
trace characterization symposium, 295
Natural gas
reservoir development, review of radioisotopes uses, 102-10
Navigational aids
operation of SNAP powered, 78, 392
Neutron generators
activation analysis applications, 301-03
development and use in oil well logging, 106-07
Neutron sources
development and applications in the petroleum industry, 105-07
use in Australia, 271-72
use to study radiation damage in semiconductors, 58-63
Neutrons
defect production in semiconductors, 61-62
New Hampshire
regulation of radioactive materials, 392
New York Veterinary College
radioisotopes use in veterinary medicine, 382-83
Nichrome wire
stress-strain studies using kryptonates, 327-28
Notre Dame University
Radiation Chemistry Data Center established, 175
Nuclear explosions
production of transplutonium elements, 315-16
Nuclear Materials and Equipment Corporation
food-irradiation program, 361-62
Nuclear Science and Engineering Corporation
radioisotopes availability, 80
Nylon
radiation graft polymerization effects, 57

O

Oak Ridge National Laboratory (ORNL)
chemistry of stable isotope recovery, 193-200, 312-15
computer codes for isotopes calculations, 18-20
HFIR operation, 80-81
Isotopes Information Center description, 179-84
Isotopes Information Center opened, 174-75
radioactive material shipment to France, 80
radioisotopes half-lives revisions, 294
radioisotopes price changes, 79, 293
radioisotopes production changes, 174, 288-89, 292
radioisotopes shipments in 1965, 172
radioisotopic source use in effects on semiconductors, 58-63
stable isotope inventory additions, 79-80, 174, 393
standard gamma spectra library available, 174
Oceans
^{14}C and ^{3}H measurements in, 25-26
sediment density and moisture probe, 216, 285
Oil wells
(see also Petroleum)
fluid-injection and production profiles, 103-05
logging using activation analysis, 106-07, 226-27
On-Board-Ship Irradiator
description, 32, 346-48
Oregon
regulation of radioactive materials, 76-77
Ores
(see also Titanium ores and Zirconium ores)
gamma activation analysis, 334-37
prospecting, use of activation analysis, 226-27
prospecting, use of gamma logging, 225-26
Organic solutions
analysis using kryptonates, 211
Organs
visualization using low energy sources, 101-02
Osmium-191
price changes, 293
Osmium isotopes
stable, purification of enriched, 314-15
Oxidation
high temperature kinetics, 325-26
studies using kryptonates, 322-26
Oxygen
determination in steel by activation analysis, 302
radiation sensitization of bacteria, 233
Oxytetracycline
food preservation using, effects in combination with irradiation, 43

P

Pacemakers
(see Cardiac pacemakers)
Packaging materials
use in radiation processing of foods, 37-38
Paint
corrosion protection properties, 326
Pasteurization
(see Radiation preservation)
Pathogens
role in quality of fresh and irradiated fish, 371-72
Petroleum
(see also Oil wells)
reservoir development, review of radioisotopes uses, 102-10
tracer uses in Romanian industry, 387
vanadium determination by activation analysis, 302
Pharmaceuticals
radiation processing, use of chemical sensitizers, 232-34
sterilization by electron irradiation, 306
tracer uses in Romania, 388
Phase changes
detection using kryptonates, 327
Phosphorus-32
sale and production withdrawal, 174
Photochemical separation
methods, literature review, 200-03
Photographic film
evaluation for radiography use, 98
Pittsburgh University, Pennsylvania
47-in. cyclotron operation, radioisotope production, 85-87
Plastics
(see also Wood-plastic combinations)
production by accelerator irradiation, 304-05
radiation linking processes, 53
radiation-produced, process development, 290
Platinum isotopes
stable, purification of enriched, 313-14
Plutonium-238
production for heat sources, 289
use in cardiac pacemaker, 293
Polonium-210
production, 289
use in SNAP generator, 393
Polonium–beryllium sources
use in petroleum industry, 105
Polyethylene
production by accelerator irradiation, 304
radiation-produced, process development, 290
Polymerization
(see Radiation polymerization)

Polymers
(see Plastics)
Polystyrene
radiation grafting to wood cellulose, 117
Potassium-42
sale and production withdrawal, 174
Potassium sorbate
food preservation using, effects in combination with irradiation, 44
Potatoes
irradiated, Canadian facility description, 294
Poultry
U. S. production in 1963, 35
Promethium-147
bremsstrahlung yield equations, 91
price changes, 79, 189
properties as power source material, 149
use in medical radiography, 99, 101
Promethium oxides
properties as isotopic power source material, 149
Propellants
solid, radiographic inspection developments, 300
PULSTAR
facilities description and operation, 14-17

Q

Quality control
application of activation analysis, 284

R

Radiation
(see also Gamma radiation, Neutrons and Ultraviolet radiation)
dose-rate dependence of polymerizations in wood, 123, 125-27
effects on cellulose and wood, 120, 237-38
effects on initiation of polymerization and cross-linking processes, 119, 236-43
effects on seafood quality, 367
effects on semiconductors, 58-63, 305-06
Radiation chemistry
aqueous solutions research in Greece, 74
research activities of Western New York Nuclear Research Center, 13-14
Radiation Chemistry Data Center
establishment and functions, 175
Radiation detection instruments
application in x-ray fluorescence analysis, 92-95
Radiation pasteurization
(see Radiation preservation)
Radiation polymerization
development programs, 50
dose requirements for, 50
electron accelerator applications, 304-05
methods for various materials, 54-55
monomers in the solid state, 52
surface grafting processes, 54
textile fiber modification, 55-58
wood-plastic combinations, economic aspects, 136-43
wood-plastic combinations, grafting to cellulose, 238
wood-plastic combinations, swelling agent effects, 239-42
wood-plastic combinations, technical aspects, 115-36
Radiation preservation
development progress, 164, 189-90, 290-91, 350-51
economic aspects of commercial, 34-42
effects in combination with food additives, 42-46
fish, quality and wholesomeness, 365-78
food, irradiation facilities descriptions, 30-33, 340-49
fruit, review of AEC program, 356-57
meat, review of Army program, 353-56
military-industry conference, 167-69
MPDI use by industry, 78
toxicological safety, 352-53
use of chemical sensitizers, literature review, 232-34
Radiation processing
development program, 164, 188-89, 289-90
electron accelerator applications, 303-08
food, 1965 JCAE hearings, 349-65
Radiation sensitizers
food preservation using, effects in combination with irradiation, 44
use in food, drugs, and medical supplies, literature review, 232-34
Radiation sources
(see Sources)
Radiation sterilization
(see also Radiation preservation)
electron accelerator applications, 306-07
facilities for medical supplies, 166
standards for food, 352
use of chemical sensitizers, literature review, 232-34
Radiation targets
(see Targets)
Radioactive materials
(see also Radioisotopes)
regulation by states, 76-77, 392
shipment to France, 80
Radiography
applications in Romania, 386
development in Greece, 74
industrial applications, growth trends, 187-88
number of gamma sources in industrial use, 159
panoramic exposure device development, 96-98
source development for medicine and industry, 96-99
suitable gamma sources, 159
world savings from industrial use, 160
x-ray generator applications, 298-301
Radioisotope generators
(see Cows (radioisotope))
Radioisotopes
(see also Radioactive materials and specific nuclides)
applications in aerospace, conference, 281-83
import into West Germany, statistics, 273
industrial applications, comparison with accelerators, 308-10
large-scale production and uses, conference, 392
ORNL shipments in 1965, 172
production and price changes, 79, 174, 288-89, 292-93
production and separation technology, AEC program, 165
production and uses, information services, 179-84
production and use in Romania, 385-89
production and use in Yugoslavia, 267-70
sales during 1965, 288
technology development, AEC program, 164-65
thermal applications development program, 285-86
Radiopharmaceuticals
medical uses, conference, 169-70
Radium–beryllium sources
use in petroleum industry, 105
Reactor fuel elements
radiographic inspection developments, 301
Reactors
(see also High Flux Isotope Reactor (HFIR))
facilities at Western New York Nuclear Research Center, 14-17
production of ^{60}Co in commercial power, 393
radioistopes production in Australia, 270-71
radioisotopes production in Yugoslavia, 267-68
Reentry Flight Demonstration No. 2 (RFD-2)
description and results of test, 67-71
Refrigeration facilities
effect of radiation preservation of food on, 39
Regulations
export and import of radioisotopes, 173
medical uses of radioisotopes, 76
Rocks
gamma activation analysis, 334-37
Romania
radioisotopes production and uses, 385-89
Rubidium-86
price changes, 293
Rudjer Boskovic Nuclear Institute
radioisotopes production, 268-69
Russia
(see Soviet Union)

S

Safety
beta source damage by fires, 71-72
results of RFD-2, 67-71
Salmonella
(see also Bacteria)
suppression by irradiation, 352
Sandia Laboratory
space isotopic power program administration, 173
Scandium-46
price changes, 293
School supplies
potential applications of wood-plastic combinations, 141
Seafoods
(see also Foods and specific seafoods)
acceptability tests on radiopasteurized, 368-69
irradiation facility descriptions, 342-44, 346-48
nutritional value of radiopasteurized, 369-70
radiation effects on biochemical composition, 367
radiation pasteurization, quality and wholesomeness studies, 365-78
radiation processing, industry studies invited, 78
review of irradiation program, 253
shelf life of irradiated, 366
U. S. catch in 1962, 36
wholesomeness of radiopasteurized, 368-69
Sediment
density and moisture probe, 216, 285
Semiconductors
properties, improvement by electron irradiation, 305-06
radiation-induced lattice defects, 58-63
Ships

on-board seafood irradiator description, 346-48
Silicon
conduction-electron removal by neutrons, 61-62
Silicon-28
availability at ORNL, 174
Silver-110m
sale and production withdrawal, 174
SNAP
(see Systems for Nuclear Auxiliary Power (SNAP))
Snow
measurement system development, 285
Sodium-24
sale and production withdrawal, 174
Sodium benzoate
food preservation using, effects in combination with irradiation, 44
Sodium carbonate
phase change detection using kryptonates, 327
Sodium chloride
food preservation using, effects in combination with irradiation, 44
Sodium nitrate
food preservation using, effects in combination with irradiation, 44
Sodium nitrite
food preservation using, effects in combination with irradiation, 44
Solid-state devices
(see Semiconductors and Transistors)
Soup
irradiation of dried, Lipton program, 364-65
Sources
(see also Beta sources, Gamma sources, Heat sources, Neutron sources and X-ray sources)
comparison of accelerators and radioisotopic, 308-10
ionization, number in industrial use, 161
potential market for radiation processing of food, 38
production and uses in Romania, 385-86
use in Australia, 271-72
use in food irradiation facilities, 340-41, 359-60
use in gages, 155
use in petroleum industry, 105
use to study radiation damage in semiconductors, 58-63
Soviet Union
use of ^{137}Cs sources, 81
Space
radioisotope applications in, conference, 281-83
Space vehicles
heat source use in rocket engines, 286
life-support systems development, 286
SNAP generator development, 393
water recovery system, 285-86
Spectrometers
(see Microwave spectrometers)
Spores
radiation sensitization by chemicals, 232-34
Sporting goods
potential applications of wood-plastic combinations, 140-41
Stable isotopes
(see also specific isotopes)
additions to ORNL inventory, 79-80, 174, 393
availability in East Germany, tables, 273-75
chemistry of electromagnetically separated, 193-200, 312-15
measurement, microwave spectroscope development, 284-85
separated, chemical and isotopic analysis, 195
separated, product purification methods, 194, 196-200, 312-15
States
(see also specific states)
radioisotopes export and import regulations, 173
regulation of radioactive materials, 76-77, 392
Steel
oxygen determination by activation analysis, 302
radiographic inspection developments, 299-300
Sterilization
(see Radiation sterilization)
Storage facilities
effect of radiation preservation of food on, 39
Stress
study using kryptonates, 327-28
Strontium-90
bremsstrahlung yield equations for ^{90}Sr-^{90}Y sources, 91
hazards evaluation of fire damaged sources, 71-72
metabolism, stochastic compartment model, 253
price changes, 79, 189
properties as power source material, 147-48
use in veterinary medicine, 383
Strontium isotopes
stable, purification of enriched, 196-98
Strontium titanate
properties as isotopic power source material, 148
Styrene
evaluation for wood-plastic combinations, 133
radiation copolymerization with acrylonitrile, 124-26
Submarines
isotopic propulsion development, 285-86
Sulfur-35
sale and production withdrawal, 174
Swelling agents
effects on polymerization in wood, 239-42
Swift and Company
food-irradiation program, 362-63
Swimsuits
heat source development, 285
Systems for Nuclear Auxiliary Power (SNAP)
characteristics and status, table, 287
development for earth orbital missions, 393
development programs, 1965-1966, 186-88
SNAP-7B operation, 78
SNAP-7F operation, 78
SNAP-9A, reentry results of RFD-2, 67-71
use on offshore oil platform, 78, 392

T

Tantalum
high-temperature oxidation kinetics, 325-26
temperature measurements using kryptonates, 320-21
Tantalum-182
price changes, 293
Targets
availability in East Germany, tables, 274-75
description for Pittsburgh 47-in. cyclotron, 86
Technetium-99m
generator development, 289
Tellurium-123
availability at ORNL, 174
Tellurium-128
availability at ORNL, 174
Temperature
effects on irradiated seafood, 367
surface measurement using kryptonates, 319-22
Tennessee
regulation of radioactive materials, 76-77
Textiles
radiation graft polymerization of fibers, 55-58
Thickness gages
low energy gamma source applications, 96-97
Thyroid gland
function test in animals, ^{131}I use, 382
Tissue
enzyme activity determination by isotopic method, 328-34
fat content measurement using low energy sources, 101
Titanium
temperature measurements using kryptonates, 319-20
Titanium ores
gamma spectra of activation products, 337
Titration
tracer uses in Romania, 386
use of kryptonates as end-point indicators, 211-12
Trace characterization
chemical and physical, conference, 295
Tracers
(see also Labeled compounds, Radioisotopes and specific isotopes)
analysis, linear compartment method, 249-54
analysis, Stewart-Hamilton equations, 255-56
chemical, use in petroleum reservoirs, 108
industrial applications, growth trends, 187
number of users in industry, 162
theory and applications in biomedicine, 245-57
theory, definitions of common terms, 257-60
use in Australia, 272-73
use in Gemini V astronauts, 81
use in groundwater hydrology, 73
use of ^{85}Kr in chemical analysis, 206-14
use in natural-gas reservoirs, 109
use in petroleum reservoirs, 108-10
use in Romania, 386-89
use in turbine-rating, 77-78, 217, 285
Transistors
properties, improvement by electron irradiation, 305-06
Translations
production and applications of isotopes, 81-82
Transplutonium elements
production by nuclear explosion, 315-16
Transportation industry
effect of radiation preservation of food on, 39
Tree rings
relationship to ^{14}C dating, 27-28
Tritium
hydrological applications, 26
licensing exemption, 392-93
measurements in the atmosphere and

oceans, 25-26
price changes, 293
processing and counting of natural, 23
tracer uses in natural-gas reservoirs, 109
use in methane detector, 217
Tubes
radiography device description, 96-98
Tumors
therapy in animals, ^{90}Sr use, 383
Tungsten-185
price changes, 293
Turbine blades
radiographic inspection developments, 300-01
temperature measurements using kryptonates, 321-22
Turbines
rating with tracers, 77-78, 217, 285
Tylosin
food preservation using, effects in combination with irradiation, 43-44

U

Ultraviolet radiation
photodegradation of reflective coatings, 326-27
United States
trends in isotopes and radiation applications, 185-91
Uranium isotopes
photochemical separation, literature review, 203
USSR
(see Soviet Union)

V

Vacuum facilities
costs for wood-plastic combinations, 137
Van de Graaff accelerators
facilities at Western New York Nuclear Research Center, 17-18
Vanadium
determination in petroleum by activation analysis, 302
Vapors
hazardous, detection using ^{85}Kr, 212-14
Vegetables
U. S. production in 1963, 35
Veterinary medicine
radioisotopes uses, 382-83
radioisotopes use in Yugoslavia, 269-70
Vinyl acetate
radiation polymerization in wood, 123, 126-27, 132-33
Vinyl chloride
evaluation for wood-plastic combinations, 125, 133
Vitamin K$_5$
food preservation using, effects in combination with irradiation, 44
radiation sensitization of bacteria, 233-34

W

Water
determination in methanol using ^{85}Kr, 211
recovery system for spacecraft, 285-86
Wear
studies using kryptonates, 324-25
Welds
radiographic inspection developments, 298-301
Well logging
gamma-gamma density device development, 107
neutron generator development for, 106-07
neutron, use in oil well studies, 226-27
Wells
(see Oil wells)
West Germany
radioisotope import statistics, 273
West Virginia University
production of wood-plastic combinations, review, 121-28
Western New York Nuclear Research Center
facilities and services description, 13-18
Wheat
irradiator description, 343, 345
U. S. production in 1963, 35
Wire
(see Nichrome wire)
Wood
compatibility with plastics, 133
impregnation by methyl methacrylate, gradient, 134
impregnation with monomers, swelling technique, 128-29
potential lumber market for wood-plastic combinations, 141
radiation effects, 120, 237-38
Wood-plastic combinations
abrasion resistance, 135
combustibility, 135
commercial aspects, conference, 280-81
development program, 290
dose-rate dependence of radiation polymerization, 123, 125-27
economics, 136-39
foreign literature review, 129-31
graft-copolymerization process study, 236-43
hardness, 134
manufacturing process, 131-34
market volume, 141
mechanical properties, 127-28, 239-42
production developments, literature review, 115-31
properties, 134-36
properties, effect of polymer penetration, 122
research and development projects, 142-43
static bending and shear strength, 134
technical and economic considerations, 131-43
uses, 140-41
water absorption, 135
World trade
effect of radiation preservation of food on, 40-41

X

X radiation
yields from alpha bombardment of targets, 215
X-ray absorptiometry
sources and applications, 95-96
X-ray fluorescence analysis
sources, detectors and applications, 91-97
use of beta-excited sources, 215-16
X-ray generators
uses for radiographic inspection, 298-301
X-ray sources
alpha-excited, development, 284
alpha-excited, use in measuring devices, 214-15
beta-excited, use in measuring devices, 215-16
description of soft, using proton bombardment, 90-91
gamma-excited, uses in Australia, 271
low energy applications, conference proceedings, 76
low energy applications, conference summary, 88-102
Xenon-133
use in gold detection device, 216

Y

Yeasts
radiation sensitization by chemicals, 232-34
Ytterbium-169
use in portable system for chest x-rays, 98-99
Yttrium-90
bremsstrahlung yield equations for ^{90}Sr-^{90}Y sources, 91
price changes, 293
Yugoslavia
radioisotopes production and use, 267-70

Z

Zinc-64
availability at ORNL, 174
Zirconium isotopes
stable, purification of enriched, 198-200
Zirconium ores
gamma spectra of activation products, 337

LEGAL NOTICE

This journal was prepared under the sponsorship of the U. S. Atomic Energy Commission. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this journal, or that the use of any information, apparatus, method, or process disclosed in this journal may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this journal.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.